

## Activity #10



### Title: Infrared (IR) at Work in the Home- Student's Copy

**Purpose:** To design an experiment which will determine the relative IR transparency of several common household materials and also to determine the maximum effective range

**Materials:** An appliance such as a VCR, DVD or CD player, air conditioner (newer models), television, etc. which can be remotely controlled by an infrared (IR) controller, clear plastic bag, colored (opaque) plastic bag, brown paper bag, facial tissue, notebook paper, cardboard, aluminum foil, tape measure (or yardstick, ruler, etc.)

**Procedure:** After determining the exact location of the internal IR receiver on your appliance...

- Predict which of the materials listed in the chart below will allow the IR signal to pass through to operate the appliance.
- Design and conduct an experimental procedure that will determine which, if any, of the following materials (listed in the chart below) is transparent to IR energy.
- For those materials that do allow the IR signal to pass through, determine the maximum effective operating range of the remote controller.
- Record all data in an organized and systematic manner and draw valid conclusions from your findings.

MATERIAL	PREDICTION
HAND	
NOTEBOOK PAPER (SINGLE SHEET)	
NOTEBOOK PAPER (DOUBLE SHEET)	
CARDBOARD (SINGLE LAYER)	
CARDBOARD (DOUBLE LAYER)	
ALUMINUM FOIL (SINGLE LAYER)	
ALUMINUM FOIL (DOUBLE LAYER)	
CLEAR PLASTIC BAG (SINGLE LAYER)	
CLEAR PLASTIC BAG (DOUBLE LAYER)	
TISSUE (SINGLE SHEET)	
TISSUE (DOUBLE SHEET)	
OPAQUE PLASTIC BAG (SINGLE LAYER)	
OPAQUE PLASTIC BAG (DOUBLE LAYER)	
BROWN PAPER BAG (SINGLE LAYER)	

BROWN PAPER BAG (DOUBLE LAYER)	
-----------------------------------	--

**Analysis questions:**

1. Describe the method you used to determine the location of the internal IR receiver in your appliance.
2. What experimental controls (parts of each trial that remained the same) did you use when testing the various materials in this activity to guarantee valid results?
3. What additional equipment/materials, if any, would be required to rank the materials from best to poorest with respect to their ability to transmit IR energy in this activity?
4. Which materials tested that were opaque to visible light did the IR pass through?
5. From your observations (required to answer question #4), why do you suppose astronomers often photograph celestial objects using IR cameras?